

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (withdrawn): An improved cartridge primer having a quantity of inorganic reactive material therein for producing a limited-life thereof.

Claim 2 (withdrawn): The improved cartridge primer of Claim 1, wherein said inorganic reactive material is in the form of a multilayer material.

Claim 3 (withdrawn): The improved cartridge primer of Claim 1, wherein said inorganic reactive material is in the form of a powder.

Claim 4 (withdrawn): The improved cartridge primer of Claim 3, wherein said powder is formed from a multilayer material.

Claim 5 (withdrawn): The improved cartridge primer of Claim 1, wherein said inorganic reactive material is in the form of a multilayer material pre-form including a foil base.

Claim 6 (withdrawn): The improved cartridge primer of Claim 2, wherein the limited-life is accomplished by an explosive containing said inorganic reactive materials which are

constructed to produce time-dependent interdiffusion of the composition of the inorganic materials.

Claim 7 (withdrawn): The improved cartridge primer of Claim 2, wherein the limited life is accomplished by an addition of a quantity of material that has a change at low temperature selected from the group consisting of a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 8 (withdrawn): The improved cartridge primer of Claim 1, wherein an extension of the limited-life by storing at low temperature is prevented by an addition of material that has a destructive phase change at low temperatures.

Claim 9 (withdrawn): The improved cartridge primer of Claim 1, wherein an extension of the limited-life by storing at low temperature is prevented by an addition of material that has a destructive thermal contraction change at low temperatures.

Claim 10 (withdrawn): The improved cartridge primer of Claim 1, wherein an extension of the limited-life by storing at low temperature is prevented by an addition of material that has a destructive internal stress change at low temperature.

Claim 11 (withdrawn): An ammunition consisting of a cartridge case, cartridge primer, propellant, and projectile, the improvement comprising:

said cartridge primer being a limited-life cartridge primer constructed of inorganic reactive materials.

Claim 12 (withdrawn): The improved cartridge primer of Claim 11, wherein said inorganic reactive materials are selected from the group consisting of: two material multilayers and three material multilayers.

Claim 13 (withdrawn): The improved cartridge primer of Claim 11, additionally including a quantity of material that has at low temperature one of: a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 14 (withdrawn): The improved cartridge primer of Claim 12, wherein said inorganic reactive materials are composed of two material multilayers having alternating layers.

Claim 15 (withdrawn): The improved cartridge primer of Claim 14, wherein said alternating layers are selected from the group consisting of Ti-B, Zr-B, Ta-B, Nb-B, B-C, Al-C, Hf-C, Ti-C, Ta-C, Si-C, Ni-Al, Ti-Al, Li-B, Li-Al, and Ni-Ti.

Claim 16 (withdrawn): The improved cartridge primer of Claim 13, wherein said quantity of material is composed of tin.

Claim 17 (currently amended): A process for producing limited-time cartridge primers, including:

forming an explosive for a cartridge primer from a quantity of inorganic reactive material having by:

Selecting at least two materials for said inorganic reactive material, said at least two materials of a type characterized by time-dependent interdiffusion of elements therebetween which reduces stored energy and reactivity in a metastable reactive interface thereof without producing a passivation layer; and

Contacting said at least two materials with each other in an arrangement adapted to realize no more than a desired shelf life based on said known time-dependent interdiffusion characteristics of the selected at least two materials, thereby producing a limited-life of the explosive.

Claim 18 (original): The process of Claim 17, additionally including providing a quantity of tin in the inorganic reactive material.

Claim 19 (currently amended): The process of Claim 17, wherein forming the explosive from a quantity of inorganic reactive material is carried out by forming depositing said at least two materials in a multilayer of the inorganic reactive material arrangement.

Claim 20 (currently amended): The process of Claim 19, wherein forming the multilayer arrangement is carried out by forming alternating layers of inorganic reactive material the at least two materials wherein the interdiffusion of elements occurs at the metastable reactive interfaces of the multilayer material thereof.

Claim 21 (original): The process of Claim 17, wherein the inorganic reactive material is formed as a powder.

Claim 22 (currently amended): The process of Claim 21, wherein the powder is produced by contacting said at least two materials to forming form a highly stressed multilayer of inorganic reacting elements that disintegrate and disintegrating the stressed multilayer into a powder.

Claim 23 (currently amended): The process of Claim 17, wherein forming the explosive of the inorganic reactive material is carried out by forming the inorganic reactive material on a foil, and then cutting quantities of selected sizes from the foil and the inorganic reactive material.

Claim 24 (original): The process of Claim 23, additionally including forming a film of tin on the foil before cutting into selected sizes.

Claim 25 (original): The process of Claim 17, additionally including depositing the inorganic reactive material in multilayers on a foil composed of materials selected from the group consisting of aluminum, nickel, and copper.

Claim 26 (original): The process of Claim 17 19, wherein the inorganic reactive material is deposited in multilayers of three different materials.

Claim 27 (original): The process of Claim ~~17~~ 19, wherein the inorganic reactive material is deposited in a multilayer of alternating layers of two different materials.

Claims 28 and 29 (cancelled)

Claim 30 (withdrawn): An ammunition including a primary initiator having a limited functional life-time.

Claim 31 (withdrawn): The ammunition of Claim 30, wherein said primary initiator includes inorganic reactive material.

Claim 32 (withdrawn): The ammunition of Claim 30, wherein said primary initiator additionally includes a quantity of tin.

Claim 33 (withdrawn): The ammunition of Claim 30, wherein said primary initiator includes a material having changes at low temperature selected from the group consisting of a destructive phase change, a thermal contraction change, and a internal stress change.

Claim 34 (withdrawn): The ammunition of Claim 33, wherein said material is composed of pure tin.

Claim 35 (withdrawn): The ammunition of Claim 31, wherein said inorganic reactive material is composed of a reactive material multilayer selected from the group consisting of two materials and three materials.

Claim 36 (withdrawn): The ammunition of Claim 35, wherein said reactive material multilayer is composed of alternating layers of two materials, selected from the group consisting of Ti-B, Zr-B, Ta-B, Nb-B, Al-C, Ti-C, Hf-C, Ta-C, Si-C, Ni-Al, Li-B, Li-Al, and Ni-Ti.

Claim 37 (withdrawn): The ammunition of Claim 35, wherein said alternating layers are deposited on a foil composed of materials selected from the group of aluminum, nickel, and copper.

Claim 38 (withdrawn): The ammunition of Claim 37, wherein said foil containing said deposited alternating layers is converted to pre-forms containing sections of said foil and said deposited alternating layers of reactive materials.

Claim 39 (withdrawn): The ammunition of Claim 35, wherein said multilayer is highly stressed so as to disintegrate to a powder of inorganic reactive material.

Claim 40 (withdrawn): The ammunition of Claim 35, wherein said reactive material multilayer is composed of layers of three materials, selected from the group consisting of Ti-Al-CuO, Ti-C-CuO, Be-C-CuO, and Al-C-CuO.

Claim 41 (withdrawn): The ammunition of Claim 40, wherein said multilayer is converted to a powder of reactive material.

Claim 42 (withdrawn): The ammunition of Claim 30, wherein said primary initiator is activated electrically.

Claim 43 (withdrawn): The ammunition of Claim 30, wherein said primary initiator includes a quantity of a chemical explosive and an inorganic reactive multilayer material.

Claim 44 (withdrawn): The ammunition of Claim 31, wherein said primary initiator additionally includes a quantity of pure tin.

Claim 45 (withdrawn): The ammunition of Claim 30, wherein said primary initiator comprises: a first cup-like member, a second cup-like member, said first and second cup-like members being positioned in inverted relationship, an insulator positioned intermediate adjacent wall sections of said cup-like members, one of said cup-like members containing a quantity of chemical explosive material, and an inorganic reactive multilayer located adjacent a bottom section of another of said cup-like members.

Claim 46 (withdrawn): The ammunition of Claim 38, wherein said primer initiator additionally includes a quantity of tin in one of said cup-like members.

Claim 47 (withdrawn): A detonator for explosives including a primary initiator charge having a limited functional life-time.

Claim 48 (withdrawn): The detonator of Claim 47, wherein said primary initiator includes a reactive material multilayer selected from the group consisting of two elements and three elements.

Claim 49 (withdrawn): The detonator of Claim 48, additionally including means for activating said primary initiator electrically.

Claim 50 (withdrawn): The detonator of Claim 49, additionally including a quantity of chemical explosive.

Claim 51 (withdrawn): The detonator of Claim 47, additionally including a quantity of tin.

Claim 52 (withdrawn): The detonator of Claim 47, wherein extension of the limited function life-time by storing at low temperatures is prevented by the addition of a quantity of material that has changes therein at low temperature including at least one of: a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 53 (withdrawn): The improved cartridge primer of Claim 2, wherein said organic reactive material is activated electrically.

Claim 54 (original): The process of Claim 19, wherein forming a multilayer of the inorganic reactive material is carried out by depositing alternating layers of material selected from the group consisting of Ti-B, Zr-B, Ta-B, Nb-B, B-C, AL-C, Hf-C, Ti-C, Ta-C, Si-C, Ni-Al, Ti-Al, Li-B, Li-Al, and Ni-Ti.

Claim 55 (original): The process of Claim 54, wherein the depositing of the alternate layers of material is carried out by magnetron sputtering.

Claim 56 (currently amended): The process of Claim 17, additionally including forming a multilayer of the inorganic reactive material which is carried out by depositing layers of three materials selected from the group consisting of Ti-Al-CuO, Ti-C-CuO, Be-C-CuO, and Al-C-CuO.

Claim 57 (original): The process of Claim 56, wherein the depositing of the inorganic reactive material is carried out by magnetron sputtering.

Claim 58 (currently amended): The process of Claim 17, additionally including forming a multilayer of the inorganic reactive material which is carried out by depositing sequential layers of Ti, C, CuO, Cu, Ti, C, CuO, Cu, etc.

Claim 59 (currently amended): The process of Claim 17 additionally including forming a multilayer of the inorganic reactive materials material which is carried by depositing a multilayer structure having metal-carbon-oxide combinations.

Claim 60 (original): The process of Claim 59, wherein the metal-carbon-oxide combinations are selected from the group consisting of Al-C-CuO, Be-C-CuO, and Ti-Al-CuO.

Claim 61 (original): The process of Claim 17, additionally includes forming a layer of tin, and then forming the multilayer of the inorganic reactive material on the layer of tin.

Claim 62 (original): The process of Claim 61, wherein the multilayer of inorganic reactive material is composed of alternating layers of Ti and B.

Claim 63 (original): The process of Claim 61, wherein the layer of tin is formed in cup portion of a primer assembly, and the multilayer is formed on the layer of tin.

Claim 64 (currently amended): A process for producing limited-time cartridge primers, consisting essentially of:

forming a layer of tin, and

forming an explosive on the layer of tin ~~composed of a multilayer of by contacting~~
~~alternating layers of Ti and B with each other in a multilayer arrangement adapted to realize~~
~~no more than a desired shelf life based on predetermined time-dependent interdiffusion~~
~~characteristics between Ti and B, which reduces stored energy and reactivity in a metastable~~
~~reactive interface thereof without producing a passivation layer, to form a limited-time~~
cartridge primer.

Claim 65 (original): The process of Claim 64, wherein forming the explosive on the layer of tin is carried out by depositing a powder formed from alternating layers of Ti and B.

Claim 66 (original): The process of Claim 65, wherein depositing the alternating layers of Ti and B is carried out by magnetron sputtering.

Claim 67 (original): The process of Claim 64, additionally including forming the layer of tin in a cup portion of a primer assembly.

Claim 68 (withdrawn): In a process for forming a Boxer type cartridge primer including a cup, and explosive mixture, a foil, and an anvil, the improvement comprising:

utilizing an inorganic reactive multilayer material as at least a portion of the explosive mixture.

Claim 69 (withdrawn): The improvement of Claim 68, additionally including eliminating the foil.

Claim 70 (withdrawn): The improvement of Claim 68, additionally including utilizing the inorganic reactive multilayer material in a powder form as the explosive mixture.

Claim 71 (withdrawn): The improvement of Claim 68, additionally including providing the cup with a quantity of tin.

Claim 72 (withdrawn): The improvement of Claim 68, additionally including providing the inorganic reactive multilayer material in the form of multilayers and multilayer powder as the explosive mixture.

Claim 73 (withdrawn): The improvement of Claim 68, additionally including forming the inorganic reactive multilayer material from multilayers selected from the group consisting of three element and two element multilayers.

Claim 74 (withdrawn): The improvement of Claim 68, additionally including providing the cup with a quantity of material that has changes therein at a temperature of about 0 to 50°C including at least one of: a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 75 (withdrawn): The improvement of Claim 68, additionally including forming the inorganic reactive multilayer material from alternating layers of titanium and boron with a layer thickness of each in the range of 1 to 1000 nm.

Claim 76 (withdrawn): The improvement of Claim 68, additionally including forming the inorganic reactive multilayer material so that each multilayer is composed of layers of three materials.

Claim 77 (withdrawn): The improvement of Claim 76, wherein the multilayers of layers of three materials are selected from the group of materials consisting of Ti-Al-CuO, Ti-C-CuO, Be-C-CuO, and Al-C-CuO.

Claim 78 (withdrawn): The improvement of Claim 77, wherein said inorganic reactive multilayer material is converted to a powder of reactive material.

Claim 79 (withdrawn): The improvement of Claim 68, additionally including providing the inorganic reactive multilayer material in the form of multilayers of titanium and boron.

Claim 80 (withdrawn): The improvement of Claim 79, additionally including forming the multilayers of titanium and boron with a layer thickness of 20Å to 100Å each.